541.4 Measurement

This work will not be measured separately for payment.

541.4.01 Limits

General Provisions 101 through 150.

541.5 Payment

This work will be paid for at the Contract Price per detour bridge complete in place, maintained, and removed.

Payment will be made under:

Item No. 541	Detour bridge (requires width, length, and sta. no.)	Per lump sum

541.5.01 Adjustments

After the detour bridge is completed, the Engineer will include 80 percent of the Contract Price for the detour bridge in the next statement.

After the detour bridge is satisfactorily removed, the Engineer will include the remaining 20 percent in the next statement.

Section 542—Contractor Proposed Alternate to Reinforced Concrete Deck Girder

542.1 General Description

This Specification covers design requirements for superstructures proposed by the Contractor as alternates to cast-in-place reinforced concrete deck girder structures.

This work is limited to construction using precast reinforced or precast prestressed concrete stems, including AASHTO Type I beams.

For areas not specifically covered in this Specification, refer to the applicable portions of the Project Specifications, Standard and Supplemental Specifications of the Department, and Part I of the AASHTO Specifications for Highway Bridges with interim and Guide Specifications.

542.1.01 Definitions

General Provisions 101 through 150.

542.1.02 Related References

A. Standard Specifications

Section 105—Control of Work

B. Referenced Documents

AASHTO Specifications

AASHTO Specifications for Highway Bridges, including interim and Guide Specifications

542.1.03 Submittals

A. Department's Responsibilities

The Department will quickly review submittals to avoid delaying the Contractor's scheme.

The Department will judge the completeness, accuracy, and structural acceptability of submittals.

B. Contractor's Bid Price

Include the following in the bid price:

- Costs for complying with this Specification
- Costs for completing and revising the Department Plans

C. Submittals

The Contractor may bid based on using precast reinforced or precast prestressed concrete stems. When bidding is based on an alternate design, submit a Contractor-proposed alternate.

1. Follow Submittal Guidelines

   Follow these guidelines for submittals:

   a. Submit the Plan on reproducible mylar sepias.
   b. Submit design notes, except for computer printouts, on A4 paper, neatly bound, indexed, and stamped by the Design Engineer.
   c. Allow the Department 60 days from the date it receives the submission to review the construction Plan.
   d. Do not begin bridge construction until the construction Plans are reviewed and approved.
   e. Ensure that the Plans and notes indicate they have been checked by the Department's Bridge and Structural Design section.

2. Submit the Contractor-Proposed Alternate

   Even when submitting an alternate, assume responsibility for the Plans and working drawings required by Subsection 105.02, "Plans and Working Drawings."

   Submit alternate construction Plans and design notes that are prepared and stamped by the Design Engineer.

   The alternate Plans submitted shall include, but not be limited to, the items below. Indicate the information using the same format used on the Department Plans.

   a. General Plan and Elevation Sheet

      Show the following on this sheet for each Contractor-proposed alternate structure bid:

      - Span lengths
      - Pier locations
      - Minimum horizontal clearances from the pier face to the edge of the roadway
      - Minimum vertical clearances from the bottom of the lowest portion of the superstructure to the roadway surface (outside edge of shoulder to outside edge of shoulder)
      - The 28-day concrete strength for the superstructure and substructure
      - Yield and working strengths of the reinforcing steel proposed for the superstructure and the substructure
      - Design Specifications and interim Specifications used during the design of the structure
      - Design live loading, impact factor, and the future wearing surface loading.

   b. Details of the Proposed Structure

      On projects that involve widening existing structures, eliminate the tie strips shown on the Department Plans. Include in the proposal for the Project the cost savings from eliminating the tie strips.

      Include the following items in the structure details:

      - Each cross section at the midspan, end bent, and intermediate bent showing reinforcing steel size, spacing, and location
      - Concrete dimensions relative to computing the structural properties of the members
      - The dimensions of fillets
      - The spacing and size of the web stirrups and longitudinal reinforcing, shown in a longitudinal view of the stem
      - Design notes indicating how the spacings and sizes of reinforcing bars were obtained

   c. Details of the Size and Type of Tendons for Prestressed Alternate

      Include on the drawings the size and type of tendons for prestressed alternate, the horizontal location, and the vertical profile. Also include the following:

      - Location of the hold-down point for the tendons
      - Initial prestress force and strength of concrete when the tendons are released
      - Method of retaining the depressed tendons in place
      - Calculations for determining the tendon elongation required to produce the specified pretensioning force

- Calculations for determining the casting length
- Detensioning schedule

d. Dead Load Deflections from the Slab, Stem, Coping, and Barrier

e. Camber for the Stems

Include in the camber the effects of vertical curvature.

542.2 Materials

General Provisions 101 through 150.

542.2.01 Delivery, Storage, and Handling

General Provisions 101 through 150.

542.3 Construction Requirements

542.3.01 Personnel

General Provisions 101 through 150.

542.3.02 Equipment

General Provisions 101 through 150.

542.3.03 Preparation

General Provisions 101 through 150.

542.3.04 Fabrication

General Provisions 101 through 150.

542.3.05 Construction

A. Design and Construct Team

Contractor-proposed alternates are considered a design and construct proposal. The design and construct team shall consist of a Contractor and a Design Engineer.

1. Contractor

   The Contractor is responsible for engineering design, drawing, detailing, Plan preparation, printing, and other Work necessary to modify the Department Plans for the proposed scheme.

2. Design Engineer

   The Design Engineer must be registered as a Professional Engineer in the State of Georgia.

   The Design Engineer is responsible for the following:

   - Remain a part of the team and be available to discuss the Project with the Department at any time during the Project.
   - Keep a record of Project-related communications with the Department, including copies of correspondence and transcripts of conversations.
   - Provide copies of the communication record to the Department and the Contractor.

B. Criteria for Contractor-Proposed Alternates

Contractor-proposed alternates shall be subject to the following criteria:

1. Comply with the traffic handling and sequence of operation schemes found on the Plans and Specifications.
2. Do not change the following items from the Department Plans:
   - Horizontal and vertical alignments
   - Beginning and ending bridge stations
   - Minimum horizontal clearance
   - Span lengths
3. If necessary, reduce vertical clearances from those indicated on the Plans by following the restrictions below and submitting mathematical computations indicating a check of revised vertical clearance.

a. Ensure that the minimum vertical clearance as measured from the lowest point of the bridge superstructure to the roadway beneath is no less than 16.5 ft (5.1 m) the minimum amount shown on the Plans, whichever is less.

b. Do not reduce the vertical clearance from the bottom of the superstructure to the flood elevations indicated on the Plans if either of these situations occur:

- The proposed alternate involves a structure crossing a waterway.
- The bottom of the beam intrudes into the 100-year flood plain.

4. Construct the bridge superstructure using either a precast reinforced or precast prestressed concrete stem that meet the following criteria:

a. The section depth, measured from the top of the top slab to the bottom of the stem may deviate from the Plans if the vertical clearance requirement in Item 3 of Subsection 542.3.05.B,3 "Criteria for Contractor-Proposed Alternates," is satisfied.

The stem depth shall be constant throughout the length of each structure unless indicated otherwise on the Plans.

b. The stem and deck thicknesses may vary from the Plans; however, the center-to-center stem spacing shall not vary.

c. Give particular attention to skewed structures. The Plans shall clearly indicate all dapouts and skewed end dimensions.

d. Precast stems shall be fabricated at a site approved by the Department.

e. Precast stems shall be designed for construction without using falsework.

5. Meet the following design criteria for alternate Plans:

a. The bearing area and edge distance requirements follow AASHTO Specifications.

b. The substructure remains as designed on the Department Plans except for the following adjustments:

- Elevations that accommodate a deeper superstructure
- Cap widths that provide adequate bearing area

The Department will not allow adjustments in substructure quantities resulting from adjusting the elevations or cap widths.

c. The design complies with applicable requirements of the following:

- Current AASHTO Specifications for highway bridges, including interim and guide Specifications
- This Specification

If this Specification and the AASHTO Specifications conflict, this Specification shall apply.

d. The structure meets the AASHTO live-loading requirement indicated on the Department Plans.

e. The design dead load of the structure considers the following:

- Weight of the structure
- Weight of the future wearing surface
- Construction loads

f. Precast prestressed concrete stems meets the following requirements:

- Initial tension (before losses from creep and shrinkage) shall not exceed 200 psi (1.38 MPa) or $3\sqrt{f'_{ci}}$
- Final tension (after losses) shall not exceed $3\sqrt{f'_{c}}$

g. Concrete is normal weight and has a minimum concrete cylinder compression strength at 28 days of at least that indicated on the Plans.

For design purposes, do not consider 28-day concrete strength above 3,000 psi (20 MPa) for cast-in-place deck construction.

h. The deck has drain openings the same shape, size, and location as those shown on the Plans.

i. The barrier curbs are not considered effective in resisting longitudinal stresses and are constructed as shown on the Plans.

j. Reinforcing steel in the superstructure having a vertical clearance of 4 in (100 mm) or less, as measured from the top of the top slab to the top of the reinforcing bar, is epoxy coated if the Plans specify epoxy-coated bars.

Barrier curb reinforcing steel is epoxy coated as shown on the Department Plans.

k. The minimum cover for reinforcing steel is as shown on the Plans.

l. The effective flange depth is altered as follows:
   1) When calculating design section properties, deduct 1/4 in (6 mm) from the flange depth. However, when calculating the dead load moment, shear, and reaction, include the 1/4 in (6 mm).
   2) Where stay-in-place PSC deck panels are used, deduct 1 in (25 mm) from the effective flange depth when calculating design section properties. However, when calculating the dead load moment, shear, and reaction, include the 1 in. (25 mm).

m. Bearing pads or bearing assemblies are placed normal to beams.

   Place bearing pads or bearing assemblies no closer than 1-1/2 in (40 mm) to the end of the beams and 3 in (75 mm) to the edge of the cap.

n. Sole plates are beveled.

o. Bent tops are not sloped for bearing purposes.

p. Neoprene bearing pads used with a precast beam alternate have 3/16-in (5 mm) sealing ribs on the top and bottom of each neoprene pad.

q. The following dead loads are added to the non-composite loads for metal stay-in-place forms:

Main Slab Reinforcement Normal to Beams	9.25 lbs/ft² (45 kg/m²)
Main Slab Reinforcement Skewed to Beams	16.00 lbs/ft² (78 kg/m²)

542.3.06 Quality Acceptance

General Provisions 101 through 150.

542.3.07 Contractor Warranty and Maintenance

Ensure the following:

- The design meets the Specification requirements for final design loads.
- Calculations and construction engineering ensure that adjustments during construction account for deflections.
- Proper line, grade, structural capacity, and stresses in the substructure and the superstructure are retained during construction.

542.4 Measurement

Material or work required to construct the Contractor-proposed concrete superstructures are not measured for payment.

Payment for the superstructure will be full compensation for furnishing the labor, materials, equipment, tools, and incidentals necessary to complete the Work, including the following:

- Concrete
- Reinforcing steel
- Expansion joint material
- Waterproofing
- Bearing pads
- Barrier concrete
- Design
- Redesign
- Plan preparation
- Shop drawings
- Concrete finish
- Other superstructure elements necessary for constructing the bridge

542.4.01 Limits

A. Additional Compensation

No additional compensation will be made for the following:

- Additional material, equipment, or other items the Department requires after its review of the Contractor's alternate for Project Specification conformance
- Changes or deviations from the Contractor's Plan, as approved by the Department
- Additional material, equipment, or other costs needed because of changes in the Contractor's Plan

542.5 Payment

A. Preparation and Review Time

Charge the time required for preparation of construction plans and design notes to the allowable Contract time.

B. Superstructure

Work performed and materials furnished in place as required by this Specification will be paid for at the Contract Price bid for "Lump Superstr Conc, CL, Br. No." and "Lump Superstr Reinf Steel, Br No."

C. Superstructure—Bridge Complete

Work performed and materials furnished in place as required by this Specification will be paid for at the Contract Price bid for "Lump Construction of Bridge Complete to Bottom of Cap—Alt 4."

542.5.01 Adjustments

A. Partial Payment

The Department will determine a schedule for partial payments for the lump superstructure items.

Section 543—Bridge Complete

543.1 General Description

This work consists of constructing the bridge complete as shown in the Contract. The work includes furnishing and placing all bridge components from the bottom of the cap to the top of the superstructure.

543.1.01 Definitions

General Provisions 101 through 150.

543.1.02 Related References

A. Standard Specifications

Section 211—Bridge Excavation and Backfill

Section 500—Concrete Structures

Section 511—Reinforcement Steel

Sections 500 to 542

B. Referenced Documents

AASHTO Specifications

543.1.03 Submittals

A. Alternative Designs

The Contractor may submit for approval an alternative design for the portion of the bridge between the top of the superstructure and the bottom of the cap. The alternative design shall meet the following criteria:

- The design conforms to current AASHTO Specifications, including the latest Interim Specifications.
- The design live load is HS20-44, including impact.